

IN THE CLAIMS:

This listing of claims will replace all prior versions, and listings, of claims in the application:

1. (Currently Amended) An optical apparatus [[having]] comprising:
an optical system [[provided with]] comprising a separable partial optical system;
a variable optical-property element arranged in the optical system, a ray-deflecting
function of the variable optical-property element being changeable itself;
a driving circuit for driving the variable optical-property element; and
an arithmetical circuit,

wherein [[a]] the ray-deflecting function [[of ray deflection]] of the variable optical-
property element is changed in accordance with a change an [[area of an]] object area
corresponding to an image to be used so that aberration of the optical system caused by the
change of the object area is [[optimized]] compensated for.

2. (Currently Amended) An optical apparatus [[having]] comprising:
an optical system having a variable optical-property element[[,]];
a driving circuit for driving the variable optical-property element [[, and]] ;
an image sensor; and
an image processor,

wherein the optical apparatus is provided with an electronic zoom function in that an
image formed on the image sensor by the optical system is magnified by the image processor,
and

wherein the ray-deflecting function of the variable optical-property element is
changed in accordance with performance of the electronic zoom function.

3. (Currently Amended) An optical apparatus according to claim 2, [[further
having]] wherein the optical system comprises at least two optical element units, and wherein
when the electronic zoom function is performed, at least one of the optical element units is
subjected to a change [[when the electronic zoom is performed]].

4. (Currently Amended) An optical apparatus [[which is capable of changing a magnification, having an]] comprising:

a variable magnification optical system [[provided with]] comprising a separable partial optical system;

a variable optical-property element arranged in the variable magnification optical system, a ray-deflecting function of the variable optical-property element being changeable itself;

a driving circuit for driving the variable optical-property element; and
an arithmetical circuit,

wherein [[a]] the ray-deflecting function [[of ray deflection]] of the variable optical-property element is changed in accordance with a magnification change of the variable magnification optical system [[and thereby]] so that aberration of the variable magnification optical system varied in accordance with the magnification change is [[optimized]] compensated for.

5. (Currently Amended) An optical apparatus [[having]] comprising:

an optical system [[provided with]] comprising a combination of a plurality of [[combined]] optical units [, wherein one of the optical units has]];

a variable optical-property element arranged in one of the plurality of optical units, a ray-deflecting function of the variable optical-property element being changeable itself;

a driving circuit for driving the variable optical-property element; and
an arithmetical circuit,

wherein the plurality of optical units are independent of one another, and

wherein a ray-deflecting function [[of ray deflection]] of the variable optical-property element is changed in accordance with a change of [[a]] the combination of the optical units so that aberration of the optical system varied in accordance with [[a]] the change of the ray-deflecting function [[of ray deflection]] is [[optimized compensated for.

6. (Currently Amended) An optical apparatus [[having an]] comprising:

a variable magnification optical system [[provided with]] comprising a combination of a plurality of optical units [, wherein one of the optical units has]];

a variable optical-property element arranged in one of the plurality of optical units, a ray-deflecting function of the variable optical-property element being changeable itself;

a driving circuit for driving the variable optical-property element; and
an arithmetical circuit,
wherein the plurality of optical units are separable from one another, and
wherein a ray-deflecting function [[of ray deflection]] of the variable optical-property
element is changed in accordance with a magnification change of the variable magnification
optical system so that aberration of the variable magnification optical system varied in
accordance with the magnification change is [[optimized]] compensated for.

7. (Original) An optical apparatus according to claim 1, wherein the optical apparatus is an observation apparatus.

8. (Original) An optical apparatus according to claim 1, wherein the optical apparatus is a telescope.

9. (Original) An optical apparatus according to claim 1, wherein the optical apparatus is a microscope.

10. (Original) An optical apparatus according to claim 1, wherein the variable optical-property element is a variable focal-length lens.

11. (Original) An optical apparatus according to claim 1, wherein the variable optical-property element is a variable mirror.

12. (Currently Amended) An optical apparatus [[having]] comprising:
an optical system [[provided with]];
an image sensor; and
an image processor,
wherein the optical apparatus is provided with an electronic zoom function in that an
image formed on the image sensor by the optical system is magnified by the image processor,
and
wherein a part of the optical system is changed [[when]] in accordance with
performance of the electronic zoom [[is performed, and thereby sharpness of an image in an
area of the image to be used is improved]] function.

13. (Currently Amended) An optical apparatus [[having a variable optical property element,]] comprising:

an optical system including [[the]] a variable optical-property element[[,]];

a driving circuit for driving the variable optical-property element[[,]];

an image sensor; and

an image processor,

wherein the optical apparatus is provided with an electronic zoom function in that an image formed on the image sensor by the optical system is magnified by the image processor,
and

wherein [[the electronic zoom is performed,]] that variable optical-property element is driven by the driving circuit so that sharpness of an image in an area magnified by the electronic zoom [[of the optical system becomes]] function is maximized.

14. (Currently Amended) An optical apparatus [[having a variable optical-property element,]] comprising:

an optical system including [[the]] a variable optical-property element [[,]];

a driving circuit for driving the variable optical-property element [[,]];

an image sensor; and

an image processor,

wherein the optical apparatus is provided with an electronic zoom function in that an image formed on the image sensor by the optical system is magnified by the image processor,
and

wherein [[when electronic zoom is performed,]] the variable optical-property element is driven by the driving circuit so that sharpness of an image in an area magnified by the electronic zoom [[of the optical system becomes best]] function is determined in view of a change of an imaging state caused by at least one of a change of an object distance temperature, humidity, a manufacturing error, a change with age, vibration, and an optical magnification change.

15. (Currently Amended) An optical apparatus [[having a variable optical-property element,]] comprising:

an optical system including [[the]] a variable optical-property element [[,]];

a driving circuit for driving the variable optical-property element [[,]];

an image sensor; and

an image processor,

wherein the optical apparatus is provided with an electronic zoom function in that an image formed on the image sensor by the optical system is magnified by the image processor,
and

wherein [[when electronic zoom is performed,]] the variable optical-property element is driven by the driving circuit so that sharpness of an image in an area magnified by the electronic zoom [[of the optical system becomes best]] function is maximized upon a manufacturing error of the optical apparatus being taken into consideration.

16. (Currently Amended) An optical apparatus [[having a variable optical-property element,]] comprising:

an optical system including [[the]] a variable optical-property element [[,]];

a driving circuit for driving the variable optical-property element [[, driving information]];

an image sensor [[,]]; and

an image processor,

wherein the optical apparatus is provided with an electronic zoom function in that an image formed on the image sensor by the optical system is magnified by the image processor,
and

wherein [[when electronic zoom is used to form an image,]] the variable optical-property element is driven by the driving circuit so that aberration of an image in an area magnified by the electronic zoom [[of the optical system]] function is [[reduced]] determined.

17. (Currently Amended) An optical apparatus according to claim 2, wherein [[an]] the optical system including the variable optical-property element is a single focal-length optical system.

18. (Currently Amended) An optical apparatus according to claim 2, wherein [[an]] the optical system including the variable optical-property element is a zoom optical system.

19. (Currently Amended) An optical apparatus according to claim 2, further having an autofocus [[means]] system.

20. (Currently Amended) An optical apparatus according to claim 19,
wherein [[an image]] the driving circuit outputs driving information to be supplied to the variable optical-property element, and

wherein image-pickup operation is [[formed]] performed while [[changing]] while [[changing]] the driving information [[provided to the variable optical-property element]] is changed to find a specific value of the driving information that causes a [[focus or]] contrast of a [[formed]] picked-up image [[becomes]] to be substantially [[best]] maximized so that the variable optical-property element is driven on a basis of the specific value of the driving information.

21. (Currently Amended) An optical apparatus according to claim 2, wherein the optical apparatus further [[having]] comprises a shake sensor so as to provide an image shake [[correcting]] compensating function in that the variable optical-property element is driven by the driving circuit in accordance with a shake detected buy the shake sensor.

22. (Currently Amended) An optical apparatus [[having]] comprising:
an optical system having a variable optical-property element[[,]];
a driving circuit for driving the variable optical-property element[[,]];
an image sensor; and
an image processor,
wherein the optical system further comprises at least one optical element unit, [[and]]
wherein the optical apparatus is provided with an electric zoom function in that an image formed on the image sensor by the optical system is magnified by the image processor,
wherein [[when the electronic zoom is performed,]] the variable optical-property element and the optical element unit are [[associated with each other and]] driven in association with one another in accordance with performance of he electronic zoom function,
and

wherein the variable optical-property element is driven by the driving circuit so that
[[to thereby improve]] sharpness of [[an area of]] an image [[to be used]] in an area
magnified by the electronic zoom function is determined.

23. (Currently Amended) An optical apparatus according to claim 2, further
[[having]] comprising a stop [[so that]] constructed and arranged to be opened when the
electronic zoom function is performed [[, the stop is opened]].

24. (Currently Amended) An optical apparatus according to claim 2, wherein the
image sensor comprises a plurality of pixels and an electronic zoom magnification by the
electronic zoom function satisfies the following condition in a present state:

$$1.05 < \beta_E < 30 \times \sqrt{M/10^6}$$

where β_E is the electronic zoom magnification and M is [[the]] a number of the pixels of
[[an]] the image sensor.

25. (Currently Amended) An optical apparatus according to claim 2, wherein the
image sensor comprises a plurality of pixels and a number of the pixels of [[an]] the image
sensor satisfies the following condition in a preset state:

$$M \geq \text{two hundred thousand}$$

where M is the number of the pixels of the image sensor.

26. (Currently Amended) An optical apparatus according to claim 2, [[further
having]] wherein the optical apparatus is a telephone [[means]].

27. (Currently Amended) An optical apparatus according to claim [[26]] 2, wherein
the [[telephone means]] optical apparatus is a mobile phone.

28. (Currently Amended) An optical apparatus according to claim 2, further
[[having]] comprising an image display [[means]] element for displaying the image.

29. (Currently Amended) An optical apparatus according to claim 2, ~~[[being constructed as]]~~ wherein the optical apparatus is an endoscope.

30. (Currently Amended) An optical apparatus according to claim ~~[[1]]~~ 2, wherein the variable optical-property element is a variable mirror.

31. (Currently Amended) An optical apparatus according to claim ~~[[3]]~~ 2, wherein the optical system comprises at least two optical element units, and wherein when the electronic zoom function is performed, at least one of the optical element units is moved to thereby ~~[[improve]]~~ maximize sharpness of a part of an image to be used.

32. (Currently Amended) An electronic imaging apparatus ~~[[having]]~~ comprising:
an optical system;
a stop~~[[and]]~~ arranged in the optical system;
an image sensor~~[[,]]~~; and
an image processor,

wherein the optical apparatus is provided with an electronic zoom function in that an image formed on the image sensor by the optical system is magnified by the image processor,
and

wherein, when the electronic zoom function is performed, the stop is opened.